

07/18/00
JC772 U.S. PTO

JC869 U.S. PTO
09/618281
07/18/00

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July 18, 2000

BOX PATENT APPLICATION
Assistant Commissioner for Patents
Washington, D.C. 20231

Re: Kazuhiro YANASE
POSITION AUTHENTICATION SYSTEM AND
ELECTRONIC EQUIPMENT
USING THE SAME
Our Ref. Q60167

Dear Sir:

Attached hereto is the application identified above including 17 sheets of the specification, claims, 6 sheets of informal drawings, executed Assignment and PTO 1595 form, and executed Declaration and Power of Attorney. Also enclosed is the Information Disclosure Statement with form PTO-1449 and references.

The Government filing fee is calculated as follows:

Total claims	6	-	20	=	x	\$18.00	=	\$0.00
Independent claims	3	-	3	=	x	\$78.00	=	\$0.00
Base Fee								\$690.00

TOTAL FILING FEE	\$690.00
Recordation of Assignment	\$40.00
TOTAL FEE	\$730.00

Checks for the statutory filing fee of \$690.00 and Assignment recordation fee of \$40.00 are attached. You are also directed and authorized to charge or credit any difference or overpayment to Deposit Account No. 19-4880. The Commissioner is hereby authorized to charge any fees under 37 C.F.R. §§ 1.16 and 1.17 and any petitions for extension of time under 37 C.F.R. § 1.136 which may be required during the entire pendency of the application to Deposit Account No. 19-4880. A duplicate copy of this transmittal letter is attached.

Priority is claimed from July 23, 1999 based on Japanese Application No. 208605/1999. The priority document is enclosed herewith.

Respectfully submitted,
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POSITION AUTHENTICATION SYSTEM AND
ELECTRONIC EQUIPMENT USING THE SAME
BACKGROUND OF THE INVENTION

1. Field of the Invention

5 The present invention relates to a position authentication system and electronic equipment using the same and particularly, to a position authentication system for authenticating latitude/longitude information of a positioning system using latitude/longitude information of GPS (Global Positioning System), and electronic equipment using the same.

10 2. Description of the Related Art

GPS (Global Positioning System) has been broadly known as one of methods for specifying the position of a mobile unit. In GPS, the position of a mobile unit on the plane can be specified by measuring the apparent distances from a mobile unit to each of three or more artificial satellites 15 which transmit GPS signals (GPS satellites), and the position of the mobile unit in the height direction can be also specified by using four or more GPS satellites.

GPS is not only used for the position specification of mobile units such as a car, a ship, or an air plane, but also applied to various equipment.

20 For example, Japanese Laid-open Patent Publication No. Hei-8-240852 discloses a camera in which position information and time information on a photographing position are obtained by using GPS and the information thus obtained is recorded along with an image on a film, and a filing device for filing photographic images taken by the camera. Further, Japanese Laid-
25 open Patent Publication No. Hei-11-055741 discloses a method for obtaining

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position information by using GPS in a mobile computing terminal having a communication function, and registering the position information in a position information management center to unitarily manage the moving statuses of persons, vehicles, or the like every registration group.

5 However, the conventional equipment for specifying the position information and the time information by using GPS has no means for authenticating whether the position information and the time information are right or not.

DIGITAL EVIDENCE SYSTEM
10 Digital data (images) taken by a digital camera can be easily tampered by a computer, and thus reliability to the photographed digital images as evidence may be degraded (for example, accident records, construction records of construction works). In order to avoid this disadvantage, Japanese Laid-open Patent Publication No. Hei-10-164549 discloses an image authentication system of supplying authentication 15 information on the identity of the photographed digital image data in such a style as to be integral with and inseparable from the digital image data.

20 According to the conventional image authentication system, an image is divided into two areas (first and second areas), and authentication information is generated from the image data in one (first) area (hereinafter referred to as "first-area image data"). The authentication information thus generated is hidden into the image data in the other (second) area (hereinafter referred to as "second-area image data"), the second-area image data containing the authentication information are combined with the first-area image data, and then the combined image data are recorded.
25 When the identity is authenticated, first authentication information is

generated from the first-area image data, the authentication information hidden in the second-area image data (second authentication information) is extracted from the second-area image data, and both the authentication information pieces are collated with each other. If both are coincident with
5 each other, it is judged that the image is not tampered. Therefore, authentication means must be provided every terminal for judging the identity, and thus the cost of the terminal rises up. The above-described conventional image authentication system does not disclose the authentication of position information and time information obtained by
10 using GPS.

SUMMARY OF THE INVENTION

It is an object of the present invention to provide an authentication system which can authenticate position information and time information obtained by using GPS or the like, and electronic equipment using the
15 authentication system.

Further, it is another object of the present invention to provide an authentication system which can reduce the cost of the electronic equipment to be used.

In order to attain the above objects, according to a first aspect of the
20 present invention, there is provided an authentication system comprising: portable electronic equipment including at least a position information detecting-and transmitting-means for detecting current position information, encrypting the position information and transmitting the encrypted position information to the outside, and storage means for storing
25 reception data; and a center system for receiving the position information

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transmitted from the electronic equipment, authenticating the position information, generating place-specifying data indicated by the position information thus authenticated and then performing a copy guard-processing on the place-specifying data, and transmitting the place-specifying data thus processed to the electronic equipment which has transmitted the position information, thereby storing the place-specifying data into the storage means of the electronic equipment.

According to the authentication system thus constructed, the electronic equipment generates the current position information and transmits it to the center system. After the position information is authenticated in the center system, it is subjected to the copy guard-processing, and then returned to the electronic equipment to be stored in the storage means of the electronic equipment. Therefore, the position information which has been authenticated in the center system can be stored in the storage means of the electronic equipment.

According to a second aspect of the present invention, there is provided a position authentication system comprising: an electronic equipment including image data-generating means for photographing a desired subject to generate image data, position information-detecting means for detecting current position information, transmitting means for encrypting and transmitting the image data and position information, and storage means for storing reception signals; and a center system including receiving means for receiving the position information and image data transmitted from the electronic equipment, authenticating means for authenticating whether the position information and image data thus

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received can be decoded, place specifying data-generating means for generating place-specifying data indicated by the authenticated position information, and copy guard-processing means for adding the place-specifying data to the image data received, subjecting the data to a copy 5 guard-processing and transmitting the copy guard-processed data to the electronic equipment to store the data into the storage means of the electronic equipment.

According to the position authentication system described above, when electronic equipment having storage means for storing image data 10 such as a digital camera is used, the position information which has been authenticated in the center system can be stored in the storage means of the electronic equipment.

In order to attain the above objects, according to a third aspect of the present invention, there is provided electronic equipment for use in a 15 position authentication system, comprising: position information detecting- and transmitting-means for detecting current position information, encrypting the position information and then transmitting the encrypted position information to a center system; and storage means for receiving the place-specifying data which is generated on the basis of the position 20 information decoded and subjected to a copy guard-processing by the center system, and transmitted from the center system, and storing the received data.

According to the electronic equipment thus constructed, the position information which has been authenticated in the center system can be 25 stored in the storage means of the electronic equipment.

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BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a schematic diagram showing an embodiment of a position authentication system and electronic equipment used for the position authentication system according to the present invention;

5 Fig. 2 is a flow chart showing the operation of Fig. 1;

Fig. 3 is a block diagram showing the position authentication system and the electronic equipment used for the position authentication system;

Fig. 4 is a block diagram showing another embodiment of the position authentication system and electronic equipment used for the

10 position authentication system according to the present invention;

Fig. 5 is a schematic diagram showing a third embodiment of the position authentication system and electronic equipment used for the position authentication system according to the present invention;

15 Fig. 6 is a schematic diagram showing a fourth embodiment of the position authentication system and electronic equipment used for the position authentication system according to the present invention; and

Fig. 7 is a flow chart showing the other embodiment of the position authentication system and electronic equipment used for the position authentication system according to the present invention.

20 DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Preferred embodiments according to the present invention will be described hereunder with reference to the accompanying drawings.

Fig. 1 is a schematic diagram showing the construction of an embodiment of a position authentication system and electronic equipment
25 used for the position authentication system according to the present

invention.

In Fig. 1, digital camera 1 has GPS receiver 2 and storage device 3. A digital camera is an example of portable electronic equipment used for the position authentication system according to this embodiment.

5 The digital camera 1 writes photographed image data into the storage device 3, and at the same time it receives GPS electric wave 5 from the GPS receiver 2 and generates latitude/longitude information.

The GPS receiver 2 further encrypts the latitude/longitude information, and transmits it as position information 6 to center system 4.

10 The transmission method may be carried out in a wired or wireless (radio) mode, and it may be applied to a cellular phone network, or the like. The storage device 3 for storing image data also stores place-specifying data which is transmitted from the center system 4 while subjected to copy guard-processing.

15 The center system 4 decodes the position information 6 input from the digital camera 1 to specify a place on the basis of the latitude/longitude information thus obtained and generate place-specifying data representing the place thus specified, subjects the place-specifying data to the copy guard-processing and then transmits the place-specifying data thus processed to the digital camera 1. The center system 4 has authentication unit 9, place specifying data base 10 and copy guard device 11 as shown in the block diagram of Fig. 3 described later. The authentication unit 9 decodes the position information 6 input thereto. The place specifying data base 10 generates the place-specifying data on the basis of the 20 latitude/longitude information input thereto, and outputs the place-
25 specifying data to the authentication unit 9.

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specifying data thus generated. The copy guard device 11 outputs the place-specifying data 7 which has been subjected to the copy guard-processing.

Next, the operation of this embodiment will be described with
5 respect to the combination of the construction diagram of Fig. 1, the detailed block diagram of Fig. 3 and the flowchart of Fig. 2. The same elements as shown in Figs. 1 and 3 are represented by the same reference numerals.

First, a photographing operation of taking photographs of a desired
10 subject with digital camera 1 by a user is carried out (step 101). At this time, incident light from the subject which is taken from the lens of the digital camera 1 is converted to image data by well-known means in the digital camera 1 and then the image data is written into the storage device 3.

Subsequently, the GPS receiver 2 in the digital camera 1 receives
15 GPS electric wave transmitted from a GPS satellite group 8 at all times (step 102) to generate latitude/longitude information, encrypts the latitude/longitude information on the basis of a predetermined encrypting key and then transmits the encrypted latitude/longitude information as the position information 6 to the center system 4 (step 103).

20 The center system 4 receives the position information 6, and decodes the position information 6 in the authentication unit 9 thereof. At this time, when the latitude/longitude information has been tampered, it cannot be decoded. That is, the authentication unit 9 knows the encrypting key of the position information 6 in advance, and thus the position information 6 can
25 be normally decoded in accordance with the encryption of the position

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information. Therefore, if the position information 6 can be decoded normally, authentication coincidence is judged. On the other hand, if the position information 6 cannot be decoded normally, authentication non-coincidence is judged (step 104).

- 5 If the authentication non-coincidence is judged, the subsequent processing is not carried out, and the processing waits for input of next position information 6. If the authentication coincidence is judged, the latitude/longitude information 12 obtained through the decoding operation is input to the place specifying data base 10 from the authentication unit 9,
- 10 whereby the place-specifying data 13 indicating the place (address) specified by the latitude/longitude 12 is output.

The place-specifying data 13 is supplied to the copy guard device 11 in the center system 4, and subjected to the copy guard-processing (step 105). Thereafter, it is transmitted as copy-guarded place-specifying data 7 from the center system 4 to the digital camera 1 serving as the transmission source by a well-known method.

When receiving the place-specifying data 7 thus copy-guarded, the digital camera 1 stores the place-specifying data 7 into the storage device 3 having photographed image data so that the place-specifying data 7 are associated with the image data concerned. If the copy-guarded place-specifying data 7 are about to be copied to another recording medium from the storage device 3, the copy recording cannot be normally performed, or even if information can be recorded, the information cannot be normally reproduced, whereby unauthorized copy can be prevented. The copy guard method itself has been well known (for example, SCMS (Serial Copy

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Management System) or the like), and this method may be used.

Accordingly, it is guaranteed that the image data stored in the storage device 3 was photographed at the place indicated by the place-specifying data, and it was not photographed at another place. In other words, it is guaranteed that the digital camera 1 surely existed in the place indicated by the place-specifying data stored in the storage device 3, and thus the position authentication function can be implemented. Further, the position authentication function is carried out by the center system 4, and thus the cost-up of the digital camera 1 can be suppressed to the minimum level.

Fig. 4 is a block diagram showing another embodiment of the position authentication system and the electronic equipment used for the position authentication system according to the present invention. In Fig. 4, the same elements as shown in Fig. 3 are represented by the same reference numerals, and the description thereof is omitted.

In Fig. 4, a user takes a photograph of a desired subject by using digital camera 15 to obtain image data, and the image data thus obtained are written into processor 16 of the digital camera 15. At the same time, GPS receiver 2 receives GPS electric wave 5 transmitted from GPS satellite group 8 at all times to generate latitude/longitude information, and inputs the latitude/longitude information to the processor 16.

The processor 16 encrypts the image data and the latitude/longitude information corresponding to the image data on the basis of a predetermined encrypting key, and transmits these data to center system 20. The center system 20 receives transmission information from the digital

camera 15, and decodes the information by authentication unit 21 thereof. If the decoding is carried out normally, decoded image data 23 are supplied to copy guard device 22, and also supplies latitude/longitude information 12 to place specifying data base 10.

- 5 If the image data or latitude/longitude information is tampered, normal decoded image data or latitude/longitude information could not be obtained in the authentication unit 21. Therefore, the authentication unit 21 does not supply the decoded image data 23 to the copy guard device 22. The copy guard device 22 in the center system 20 receives from the place
10 specifying base 10 the place-specifying data 13 indicating the place (address) indicated by the latitude/longitude information 12, adds the place-specifying data 13 to the decoded image data 23 and subjects these data to the copy guard-processing. Thereafter, the center system 20 transmits these data as copy-guarded data 24 to the digital camera 15
15 serving as the transmission source by a well-known method.

When receiving the above copy-guarded data 24, the digital camera 15 stores the data 24 into the storage device 3, whereby the image data and the place-specifying data which are unique in the world are stored in the storage device 3 while they are copy-guarded. Accordingly, it is guaranteed
20 that the image data stored in the storage device 3 was photographed at the place indicated by the place-specifying data, not photographed at another place and also not tampered. In other words, the digital camera 15 surely existed at the place indicated by the place-specifying data stored in the storage device 3, and the position authentication function can be
25 implemented. When the image data can be normally decoded, it is

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authenticated that the image data were surely transmitted from the digital camera 15.

The present invention is not limited to the above embodiment, and for example when portable electronic equipment (moving terminal) is a personal computer 25 as shown in Fig. 5, there can be implemented an electric stamp function of recording the copy-guarded place-specifying data 7 as information which can be obtained only at the specific space.

Further, as shown in Fig. 6 portable electronic equipment (moving terminal) such as a digital camera, a personal computer or the like may be designed so that time information is obtained from the GPS electric wave 5. In this case, position information/time information 28 are transmitted to the center system 29, and the copy-guarded place/time specifying data 30 are transmitted from the center system 29 to the terminal 27 serving as the transmission source, whereby the specific place and time can be authenticated. Further, as shown in Fig. 7, if the authentication result of the authentication unit in step 104 indicates the authentication non-coincidence, the GPS data may be referred to at all times by receiving the GPS data (step 110).

In the above-described embodiment, the latitude/longitude information is obtained on the basis of the GPS signals from the GPS satellites. However, the position information may be obtained from PHS (Personal Handy Phone).

As described above, according to the present invention, the electronic equipment generates the current position information and transmitted it to the center system. At the center system, the position

information is authenticated and then subjected to the copy guard-processing and returns it to the electronic equipment. The electronic equipment stores the copy-guarded data into the storage means thereof. Therefore, the position information authenticated by the center system can

5 be stored in the storage means of the electronic equipment, and the position authentication function of indicating that the electronic equipment surely existed at the place indicated by the place-specifying data can be implemented. The position authentication function is carried out by the center system, so that the cost-up of the electronic equipment can be

10 suppressed to the minimum level.

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WHAT IS CLAIMED IS

1. An position authentication system, comprising:

portable electronic equipment including at least position information detecting-and transmitting-means for detecting current 5 position information, encrypting the position information and transmitting the encrypted position information to the outside, and storage means for storing reception data; and

a center system for receiving the position information transmitted from said electronic equipment, authenticating the position

10 information, generating place-specifying data indicated by the position information thus authenticated and then performing a copy guard-processing on the place-specifying data, and transmitting the place-specifying data thus processed to said electronic equipment which has transmitted the position information, thereby storing the place-specifying 15 data into said storage means of said electronic equipment.

2. The position authentication system as claimed in claim 1, wherein said center system comprises an authentication unit for receiving the position information which is encrypted and transmitted by said electronic equipment, and authenticating whether the position information received 20 can be decoded or not; a place-specifying data base for accepting the position information decoded by said authentication unit, and outputting place-specifying data representing the place indicated by the position information; and a copy guard device for subjecting the place-specifying data to the copy guard-processing and then transmitting the place-specifying data to said electronic equipment.

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3. The position authentication system as claimed in claim 1, wherein said
position information detecting-and transmitting-means detect the position
information and time information, and said center system subjects to a copy
guard-processing the signal obtained by adding the place-specifying data to
5 the time information and transmits the copy-guarded signal to said
electronic equipment to store the copy-guarded signal in said storage means
of said electronic equipment.

4. A position authentication system, comprising:

an electronic equipment including image data-generating
10 means for photographing a desired subject to generate image data, position
information detecting means for detecting current position information,
transmitting means for encrypting and transmitting the image data and
position information, and storage means for storing reception signals; and
a center system including receiving means for receiving the
15 position information and image data transmitted from said electronic
equipment, authenticating means for authenticating whether the position
information and image data thus received can be decoded, place specifying
data-generating means for generating place-specifying data indicated by
the authenticated position information, and copy guard-processing means
20 for adding the place-specifying data to the image data received, subjecting
the data to a copy guard-processing and transmitting the copy guard-
processed data to said electronic equipment to store the data into said
storage means of said electronic equipment.

5. An electronic equipment for use in a position authentication system,
25 comprising:

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position information detecting-and transmitting-means for detecting current position information, encrypting the position information and then transmitting the encrypted position information to a center system; and

- 5 storage means for receiving the place-specifying data which is generated on the basis of the position information decoded and subjected to a copy guard-processing by said center system, and transmitted from said center system, and storing the received data.

6. The electronic equipment as claimed in claim 5, wherein said position
10 information detecting-and transmitting-means is a GPS receiver for receiving a GPS signal transmitted from a GPS satellite group to obtain latitude/longitude information as the position information, encrypting the position information and then transmitting the encrypted position information.

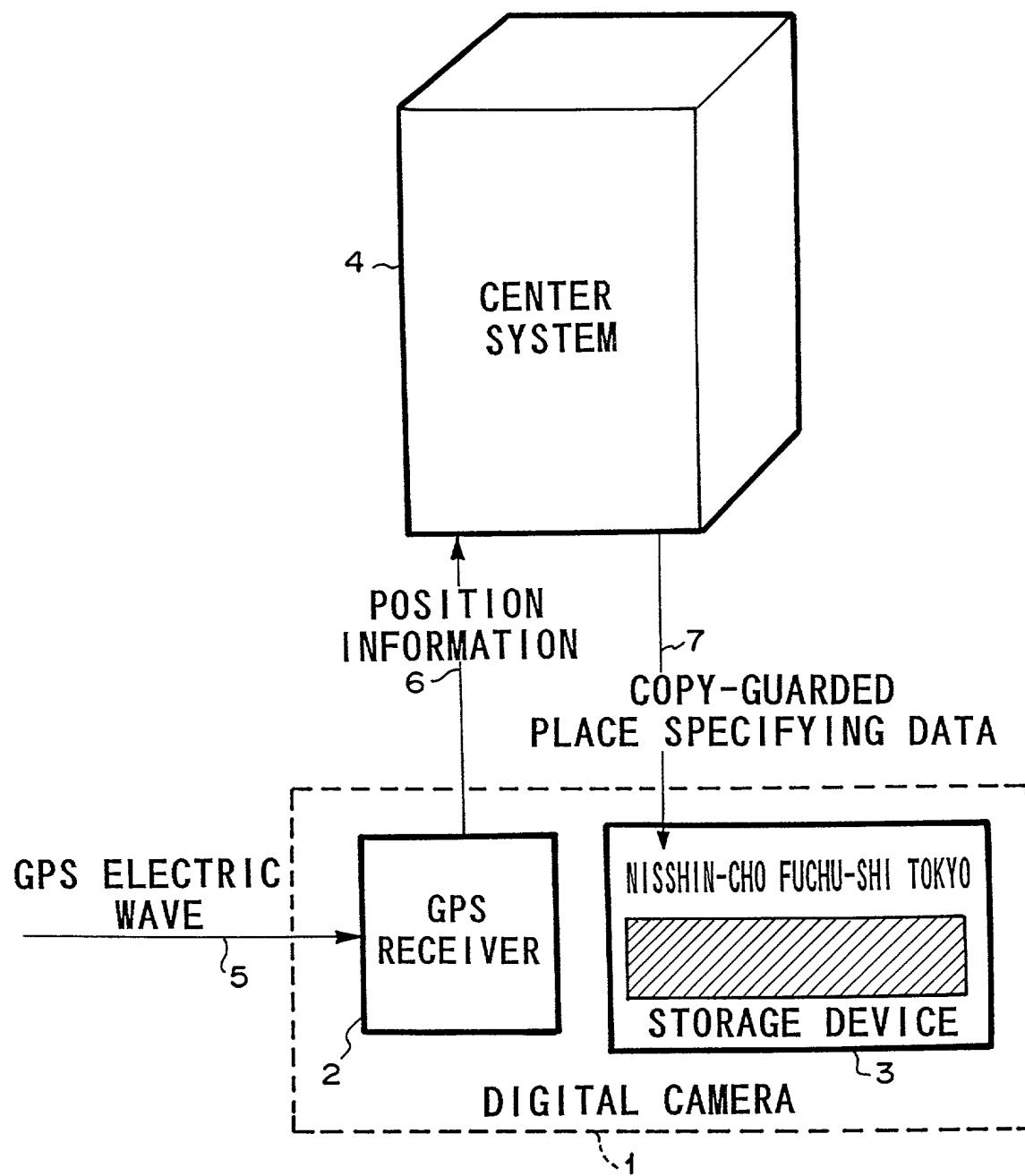
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ABSTRACT OF THE DISCLOSURE

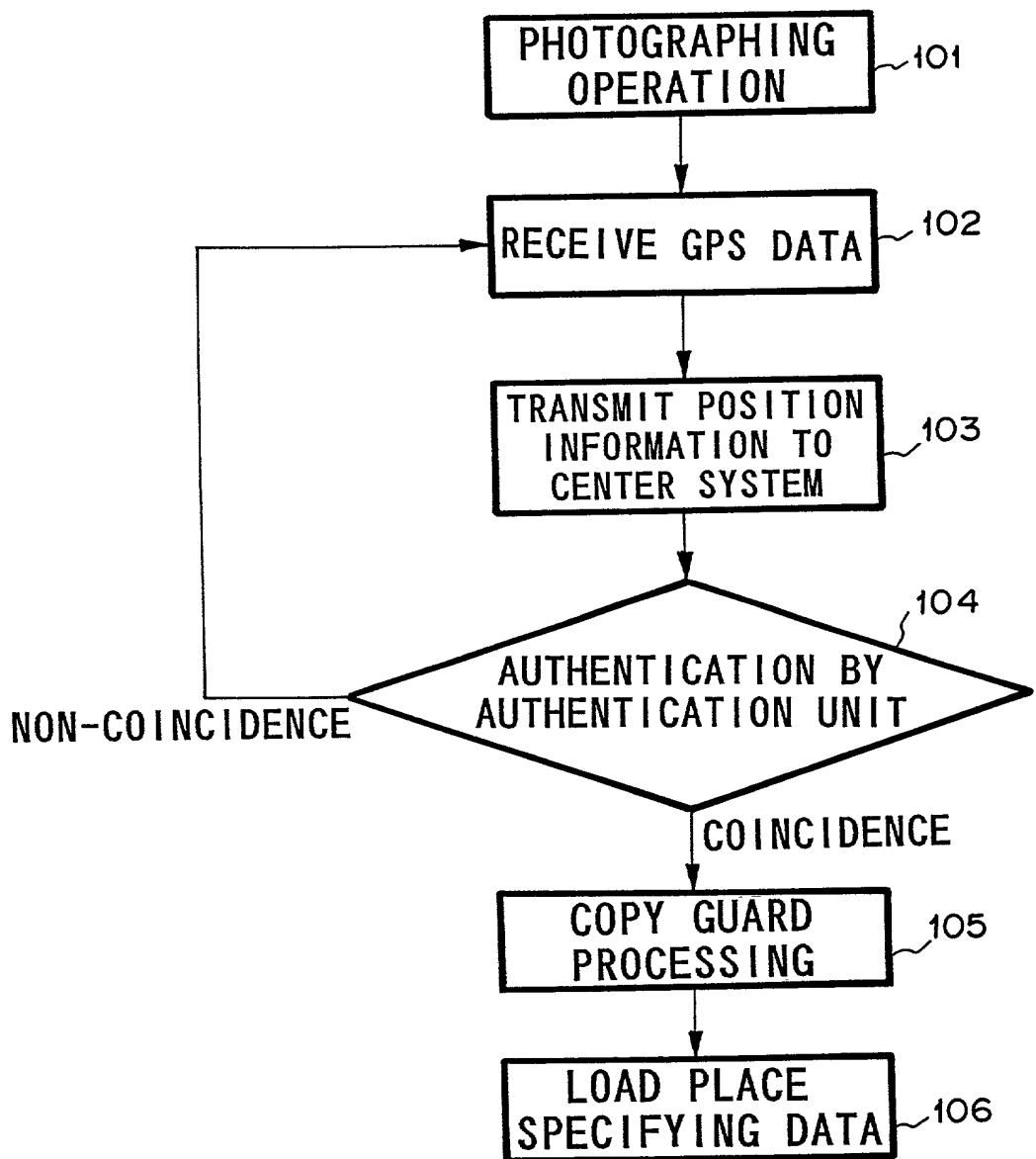
In a position authentication system and electronic equipment used for the same, image data photographed by a digital camera 1 are written into storage device 3, and at the same time GPS electric wave 5 is received
5 by GPS receiver 2 to generate latitude/longitude information. The GPS receiver 2 encrypts the latitude/longitude information, and transmits this information as position information to center system 4. The storage device 3 stores copy-guarded place-specifying data transmitted from the center system 4. The center system 4 decodes the position information 6 input from
10 the digital camera 1, and specifies the place on the basis of the latitude/longitude information thus obtained to generate place-specifying data. The place-specifying data thus generated are subjected to copy guard-processing and then transmitted to the digital camera 1. Accordingly, it is guaranteed that the image data stored in the storage device 3 was
15 photographed at the place indicated by the place-specifying data and the image data was not photographed at another place.

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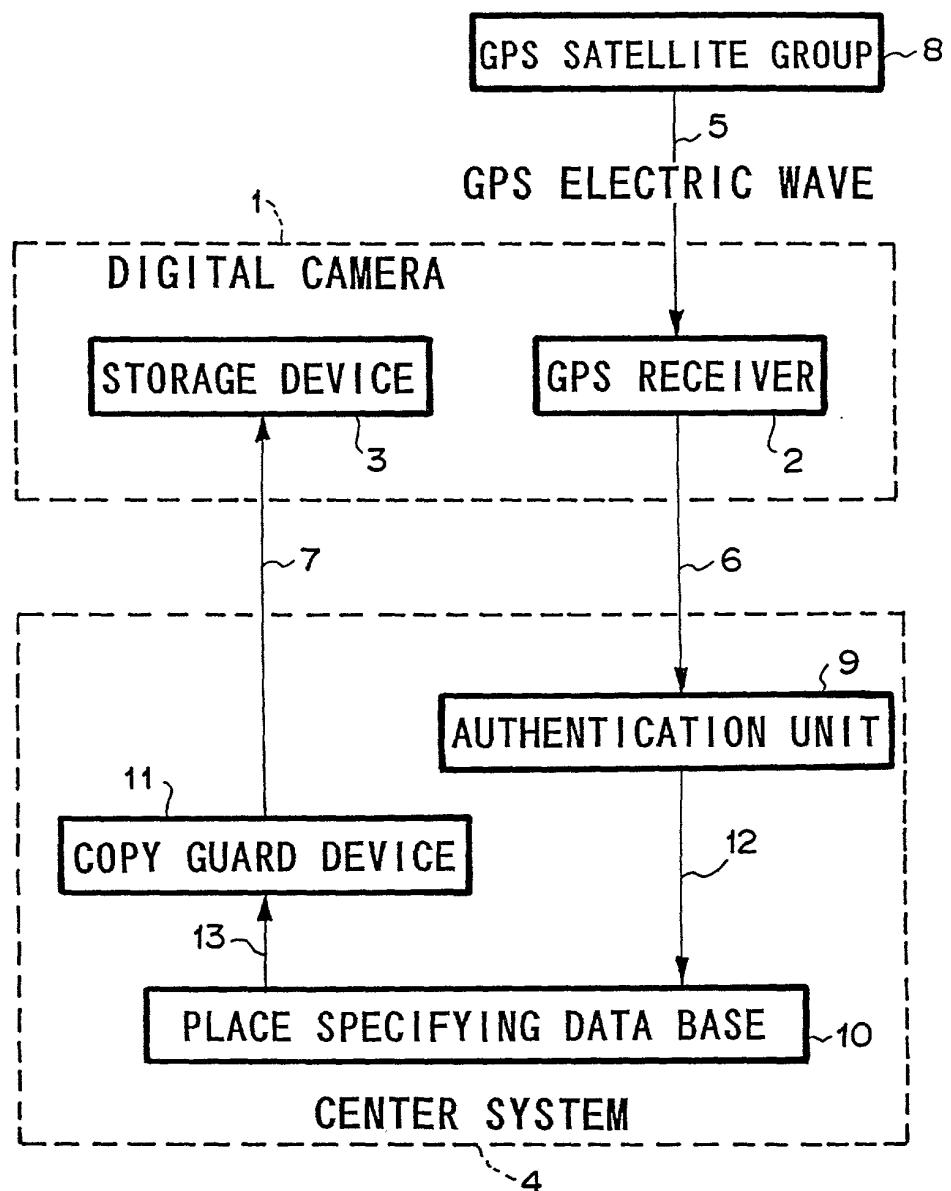
FIG. 1



F I G . 2



F I G. 3



F I G . 4

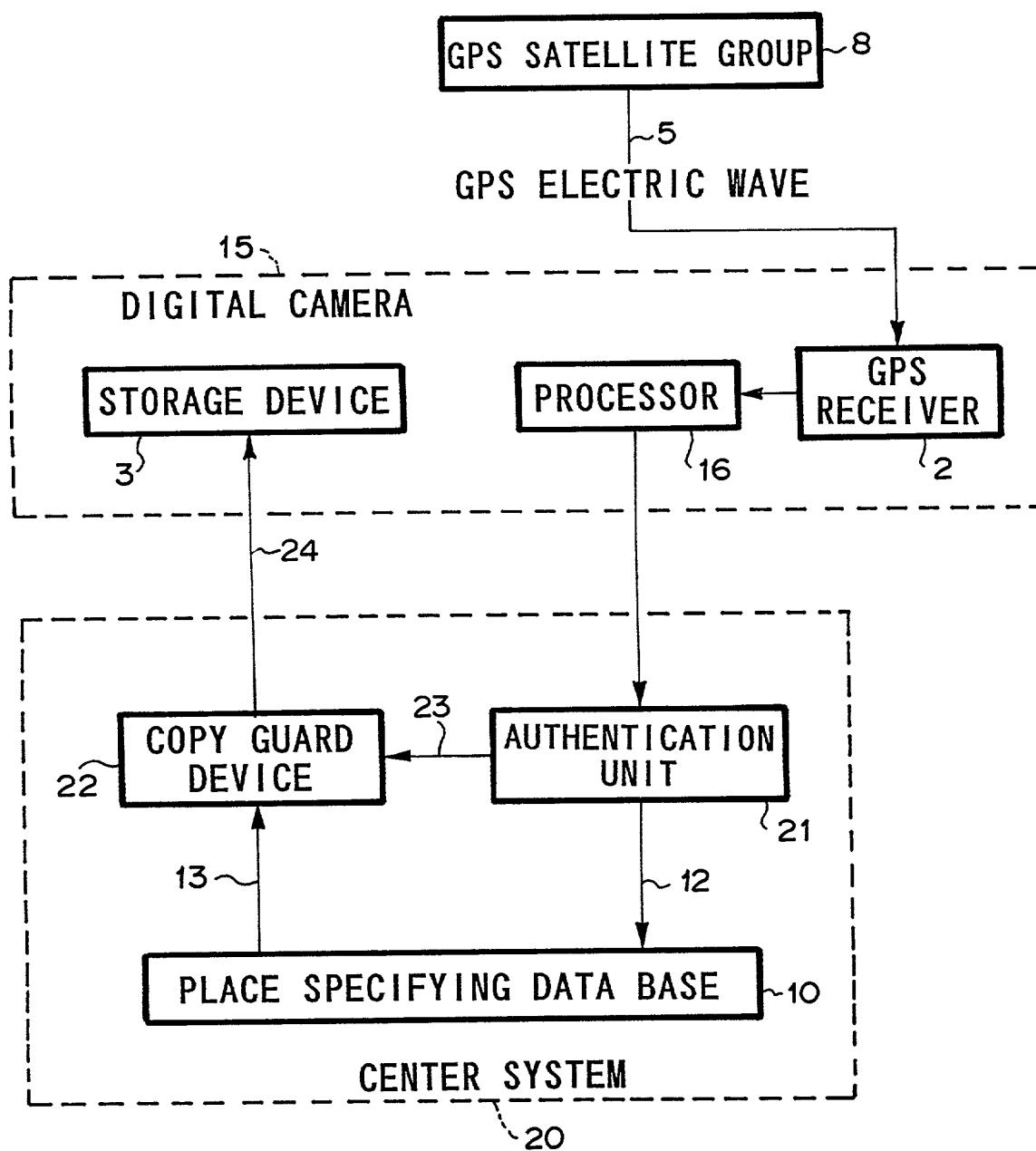


FIG. 5

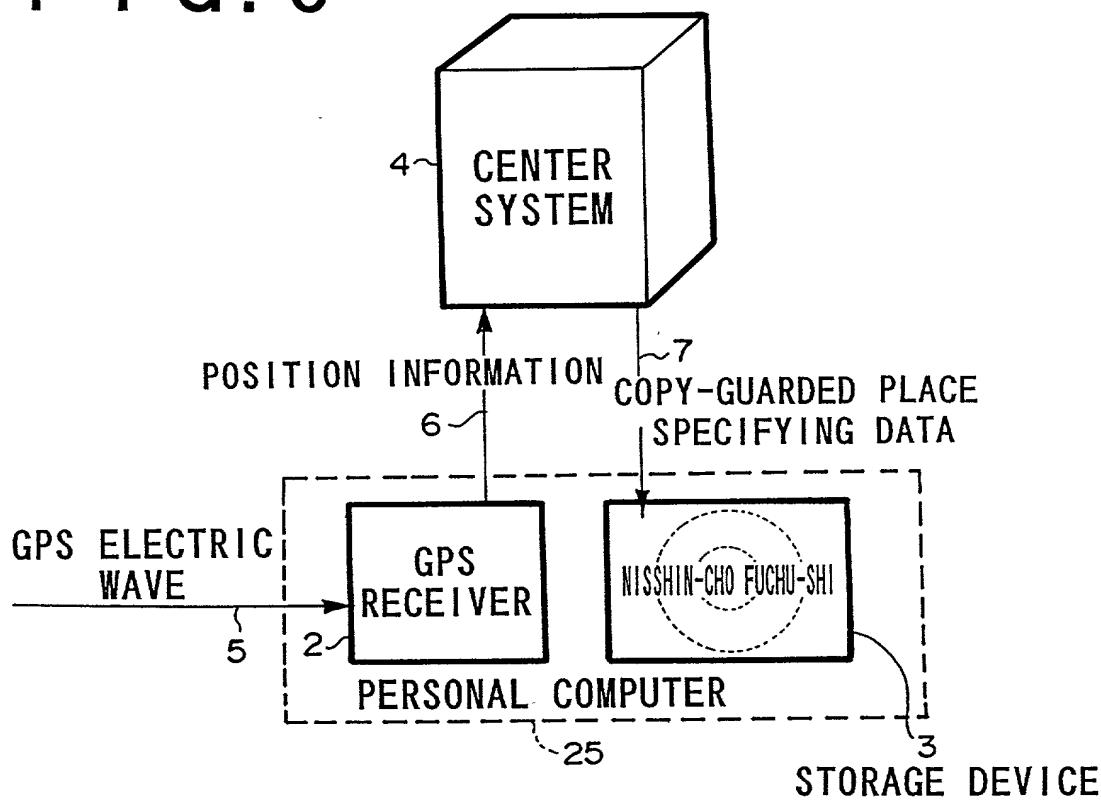
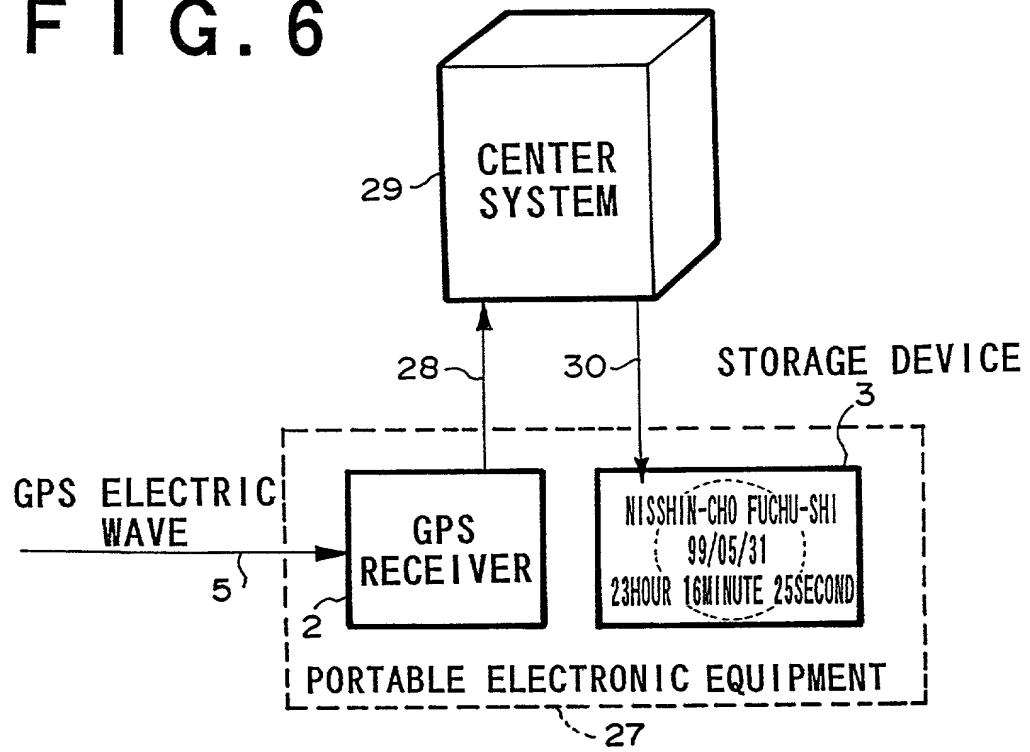
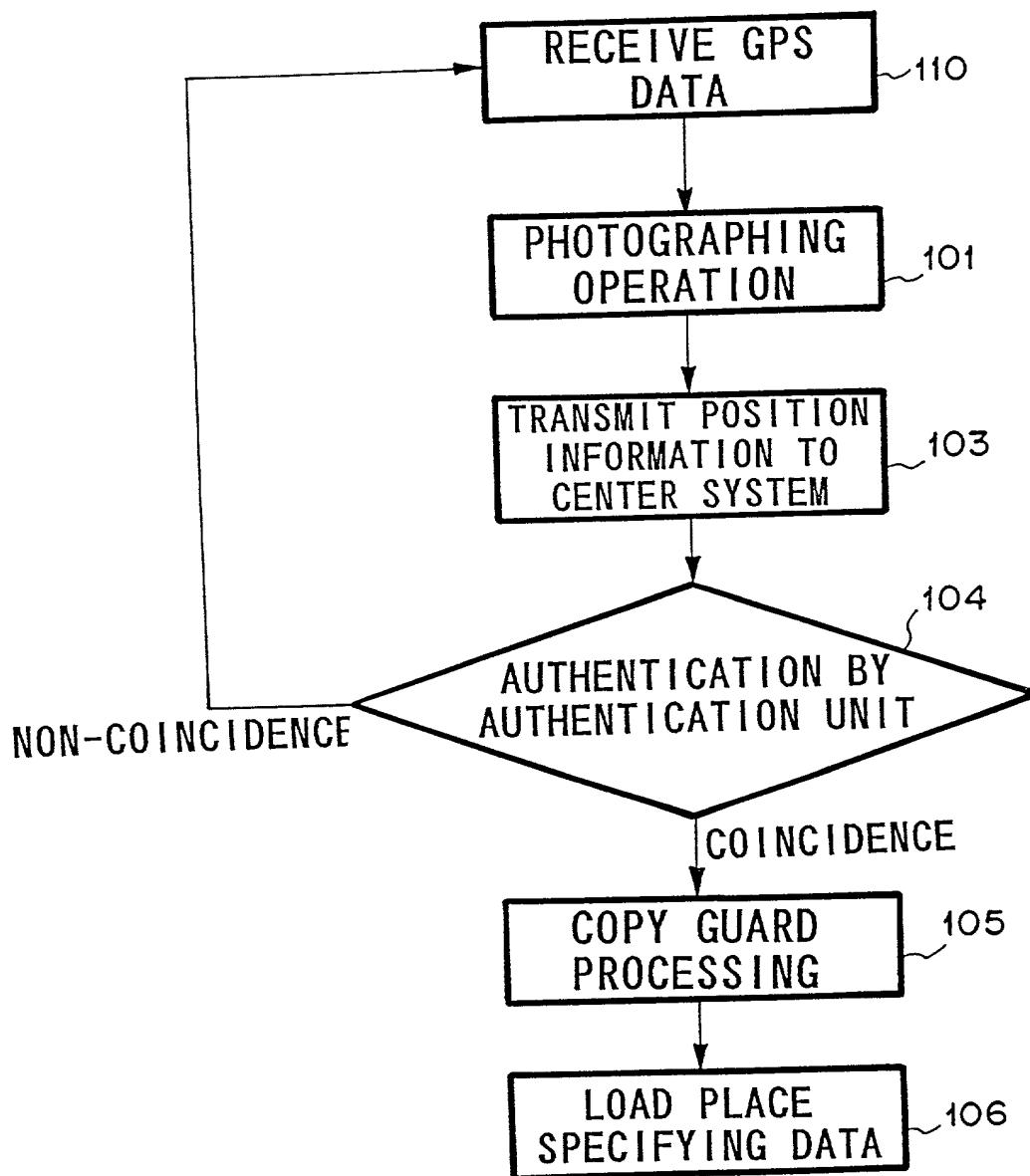


FIG. 6



F I G. 7



Declaration and Power of Attorney for Patent Application

特許出願宣言書

Japanese Language Declaration

私は、下欄に氏名を記載した発明として、以下の通り宣言する：

私の住所、郵便の宛先および国籍は、下欄に氏名に続いて記載したとおりであり。

名称の発明に関し、請求の範囲に記載した特許を求める主題の本来の、最初にして唯一の発明者である（一人の氏名のみが下欄に記載されている場合）か、もしくは本来の、最初にして共同の発明者である（複数の氏名が下欄に記載されている場合）と信じ、

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name,

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled

その明細書を
(該当するほうに印を付す)

ここに添付する。

_____ 日に出願番号

第 _____ 号として提出し、

_____ 日に補正した。
(該当する場合)

POSITION AUTHENTICATION SYSTEM

AND ELECTRONIC EQUIPMENT USING THE SAME

the specification of which
(check one)

is attached hereto.

was filed on _____ as

Application Serial No. _____

and was amended on _____
(if applicable)

私は、前記のとおり補正した請求の範囲を含む前記明細書の内容を検討し、理解したことを陳述する。

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

私は、連邦規則法典第37部第1章第56条(a)項に従い、本願の審査に所要の情報を開示すべき義務を有することを認める。

I acknowledge the duty to disclose information which is material to the examination of this application in accordance with Title 37, Code of Federal Regulations, §1.56(a).

Japanese Language Declaration

私は、合衆国法典第35部第119条、第172条、又は第365条に基づく下記の外国特許出願又は発明者証出願の外国優先権利益を主張し、さらに優先権の主張に係わる基礎出願の出願日前の出願日を有する外国特許出願又は発明者証出願を以下に明記する：

Prior foreign applications

先の外国出願

			Priority claimed 優先権の主張	
(Number) (番 号)	(Country) (国 名)	(Day/Month/Year Filed) (出願の年月日)	<input checked="" type="checkbox"/> Yes あり	<input type="checkbox"/> No なし
_____	_____	_____	<input type="checkbox"/>	<input type="checkbox"/>
_____	_____	_____	<input type="checkbox"/>	<input type="checkbox"/>
_____	_____	_____	<input type="checkbox"/>	<input type="checkbox"/>
_____	_____	_____	<input type="checkbox"/>	<input type="checkbox"/>
_____	_____	_____	<input type="checkbox"/>	<input type="checkbox"/>

私は、合衆国法典第35部第120条に基づく下記の合衆国特許出願の利益を主張し、本願の請求の範囲各項に記載の主題が合衆国法典第35部第112条第1項に規定の態様で先の合衆国出願に開示されていない限りにおいて、先の出願の出願日と本願の国内出願日又はPCT国際出願日の間に公表された連邦規則法典第37部第1章第56条(a)項に記載の所要の情報を開示すべき義務を有することを認める。

I hereby claim foreign priority benefits under Title 35, United States Code §119, §172 or §365 of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on which priority is claimed:

I hereby claim the benefit of Title 35, United States Code, §120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code, §112, I acknowledge the duty to disclose any material information as defined in Title 37, Code of Federal Regulations, §1.56(a) which occurred between the filing date of the prior application and the national or PCT international filing date of this application:

(Application Serial No.) (出願番号)	(Filing Date) (出願日)	(現況) 特許済み、係属中、放棄済み	(Status) (patented, pending abandoned)
_____	_____	_____	_____

私は、ここに自己の知識に基づいて行った陳述がすべて真実であり、自己の有する情報及び信ずるところに従って行った陳述が真実であると信じ、更に故意に虚偽の陳述等を行つた場合、合衆国法典第18部第1001条により、罰金もしくは禁固に処せられるか、又はこれらの刑が併科され、又はかかる故意による虚偽の陳述が本願ないし本願に対して付与される特許の有効性を損なうことがあることを認識して、以上の陳述を行つたことを宣言する。

I hereby declare that all statements made herein of my own knowledge are true; and further that all statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

Japanese Language Declaration

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